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FORM PTO-1390 (REV. 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: P-0105 S

U.S. APPLICATION NO (If known, see 37 CFR 1.5): 09/856393

INTERNATIONAL APPLICATION NO	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/JP99/05257	September 27, 1999	September 27, 1999

TITLE OF INVENTION: PRONUNCIATION JUDGMENT SYSTEM

APPLICANT(S) FOR DO/EO/US: Akitoshi KOJIMA

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND or SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [X] The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. [ ] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [ ] is attached hereto (required only if not communicated by the International Bureau).
   b. [X] has been communicated by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [X] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. [X] is attached hereto.
   b. [ ] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [X] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are attached hereto (required only if not communicated by the International Bureau).
   b. [ ] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [X] have not been made and will not be made.
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. [X] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English lanugage translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. [X] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [X] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [ ] A FIRST preliminary amendment.
14. [ ] A SECOND or SUBSEQUENT preliminary amendment.
15. [ ] A substitute specification.
16. [ ] A change of power of attorney and/or address letter.
17. [ ] A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. [ ] A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. [ ] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. [ ] Other items or information:

U.S. APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
09/856393	PCT/JP99/05257	P-0105 S

21 [X] The following fees are submitted:	CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$710.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$690.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$ 0	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	12 - 20 =	0	x **$18.00**	$ 0	
Independent claims	2 - 3 =	0	x **$80.00**	$ 0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$270.00**	$ 0	
TOTAL OF ABOVE CALCULATIONS =				$ 860.00	
[ ] Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.			+	$ ----	
SUBTOTAL =				$ 860.00	
Processing fee of **$130.00** for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				$ ----	
TOTAL NATIONAL FEE =				$ 860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$ 40.00	
TOTAL FEES ENCLOSED =				$ 900.00	
				Amount to be refunded:	$
				charged:	$

a. [X] A check in the amount of $ 900.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 10-0100. A duplicate copy of this sheet is enclosed.

d. [ ] Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:
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REGISTRATION NUMBER

Date:

TITLE OF THE INVENTION

PRONUNCIATION JUDGEMENT SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a Continuation Application of PCT Application No. PCT/JP99/05257, filed September 27, 1999, which was not published under PCT Article 21(2) in English.

BACKGROUND OF THE INVENTION

The present invention relates to a pronunciation judgment system using a voice recognition function for language pronunciation practice of foreign language or the like including especially English conversation, and a recording medium for storing a computer program thereof.

Conventionally, a number of language learning systems for practicing English conversation or the like have been developed. A typical system is an interaction with a computer. Here, the computer becomes one speaker, displays the face of a collocutor on the screen, and asks questions to which a user responds. This user response voice is input to the computer and recognized. Then, when it agrees with the correct answer contents, a person representing the collocutor on the screen nods, or other predetermined display is executed, it proceeds to the next question in a way to continue the conversation.

However, this system requires to examine also

the content of the response; hence the system is not appropriate for a simple pronunciation repeat practice. In short, when the response content is not correct, the conversation does not continue, in this case, the user can not determine whether the content itself was wrong or his/her pronunciation was wrong. In addition, the user can not concentrate his/her attention to the pronunciation practice, worrying about giving a correct answer. Further, the agreement with the correct answer content is determined by the comparison with a single kind of reference voice data representing the answer content and the determination is fixed; therefore, when the content agrees and only the pronunciation disagrees, the user can not know how wrong was his/her pronunciation and, hence, can not realize to which extent his/her pronunciation is understood by a foreigner. In addition, if the reference voice data level is too high, the user can not pass although he/she tries many times, loosing possibly his/her motivation.

It is an object of the present invention is to provide a pronunciation judgment system allowing to know objectively to what extent one's pronunciation is recognized by the collocutor, and a recording medium for storing a computer program thereof.

Another object of the present invention to provide a pronunciation judgment system allowing to practice

the pronunciation effectively through a repeated pronunciation practice of the same text, and display of the degree of similarity to the reference pronunciation, each time, and a recording medium for storing a computer program thereof.

BRIEF SUMMARY OF THE INVENTION

The pronunciation judgment system of the present invention comprises a database for storing reference pronunciation data, reference voice playback means for outputting the reference voice based on the reference pronunciation data, similarity determination means for comparing a user pronunciation data input in correspondence to the reference voice and the reference pronunciation data, and means for informing the user of the agreement, if the similarity determination means judges the agreement of both data.

In a preferred embodiment, the database may store a plurality of reference pronunciation data corresponding to the pronunciation fluency level, for the same language. The reference voice playback means may include a user operation member for selecting the level and output the selected level reference voice, until the informing means informs the user the agreement of both data. The database may store reference pronunciation data of a plurality of level for each of a number of sentences, while the reference voice playback means may include a user operation member for selecting

sentences and the level and output the selected level reference voice of the selected sentence, until the informing means informs the user the agreement of both data. It may further include means for displaying a sentence corresponding to the reference pronunciation data.

The computer readable recording medium for recording a program to be executed by a computer of the present invention records a computer program for executing by a computer steps of reading out the reference voice data from the database, playing back reference voice based on the read out reference voice data, judging the similarity by comparing the user pronunciation data input in correspondence to the reference voice data and the reference voice data, and informing the user of the agreement of both data if such agreement is determined by the similarity determination step.

In a preferred embodiment, the database may store a plurality of reference pronunciation data corresponding to the pronunciation fluency level, for the same language. The reference voice playback step may output the user selected level reference voice, until the informing step informs the user of the agreement of both data. The database may store reference pronunciation data of a plurality of level for each of a number of sentences, while the reference voice

playback step may output the user selected level reference voice of the user selected sentence, until the informing step informs the user of the agreement of both data. The program may execute a step of displaying a sentence corresponding to the reference pronunciation data by the computer.

The present invention allows to judge if one's pronunciation attains the level to be recognized by the collocutor, and improve the language learning (pronunciation learning) efficiency, by repeating this practice.

Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the invention, and together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the invention.

FIG. 1 is a block diagram showing a configuration

of the pronunciation judgment system according to the present invention;

FIG. 2 is a flow chart showing the flow during the pronunciation practice according to the present invention; and

FIG. 3 shows an example of lesson screen.

DETAILED DESCRIPTION OF THE INVENTION

Now, the embodiment of pronunciation judgment system of the present invention will de described.

FIG. 1 is a block diagram showing a configuration of the whole system. A CPU 10, a CD-ROM drive 12 are connected to a system bus 14. This system is realized by executing a computer program stored in the CD-ROM drive 12 by the CPU 10. A database 16 for storing reference pronunciation data serving as model of pronunciation practice, for the respective beginner's, intermediate and advanced levels and a level selection unit 18 for selecting the level of the database 16 are also connected to the system bus 14. The database 16 is constructed by collecting pronunciation signal (waveform signal) of a great number of individuals (several hundreds of thousand) and averaging pronunciation data of spectrum analysis thereof. Here, the database 16 is included in the pronunciation practice program, and it may be contained in a CD-ROM and taken in the system, each time. The beginner's level corresponds to the pronunciation of a Japanese teacher

of English, the advanced level to the pronunciation of a fluent European and American speaker, and the intermediate level to the pronunciation of a European and American speaker who does not speak so fluently. The database is not necessarily divided into three physical units, but it may only be divided functionally.

A microphone 20 for inputting the voice waveform pronounced by a user is connected to the system bus 14 through a voice recognition unit 22. The voice recognition unit 22 obtains the pronunciation data through spectrum analysis of input voice waveform. This voice recognition unit 22 should perform the same spectrum analysis as used for obtaining the pronunciation data of the database. A CRT 26 is connected to the system bus 14 through a display controller 24, and a mouse 28 and a keyboard 30 are connected through an I/O 32 and, also, a speaker 36 is connected through a voice synthesis unit 34.

Now, the operation of the present embodiment will be described referring to the flow chart shown in FIG. 2. This flow chart shows the processing flow of computer program performed by the CPU 10 and stored in the CD-ROM 12. Upon starting the operation, a lesson screen shown in FIG. 3 is displayed. This embodiment is supposed to be based on, for example, English textbook for junior high school, and be a pronunciation

practice system of texts included in the textbook. The lesson screen comprises a lesson chapter display section 50, an image display section 52 related to the lesson chapter 52, a text display section 54, a pronunciation level display section 56, and a display section 58 showing the number of times of practice per text. The lesson chapter display section 50 displays right and left triangular icons, allowing to select a lesson chapter by operating them with the mouse 28. The text display section 54 shows a plurality of texts, and a square icon showing the text selection state at the left of each text, and a heart mark icon showing a good pronunciation level determination result as the right are displayed. The heart mark icon is a success mark to be displayed a student can pronounce similarly to the model pronunciation (divided into three levels). The level display section 56 displays also the note (out of 10) for the respective level; however, this note is nothing but a standard for indicating the difficulty of respective levels. In the example of FIG. 3, the beginner's level is selected.

In step S10, the lesson chapter is selected. In step S12, the level is selected. The level is selected by selecting any level line with mouse. Here, the beginner's level is selected. In step S14, the text is selected. In the example of FIG. 3, the third "I am fine. And you?" is selected.

In step S16, the beginner's level reference pronunciation data of this selected text is read out from the database 16, the voice is synthesized at the voice synthesis unit 34 and output from the speaker 36 as model pronunciation. The model pronunciation may be output not only once but several times, and the output speed may be varied for several output.

In step S18, the user pronounces imitating this model voice. The user voice waveform is input into the voice recognition unit 22 through the microphone 20. The voice recognition unit 22 obtains the pronunciation data through the spectrum analysis of this voice signal.

In step S20, the user pronunciation data and the reference voice data stored in the database 16 are compared to obtain the similarity degree. The higher this similarity is, the closer the user pronunciation is to the reference voice, showing that the user speaks well, and one's pronunciation has a higher possibility to be communicated exactly to the collocutor and recognized correctly.

In step S22, it is determined whether this similarity is higher than a predetermined similarity, or whether this text pronunciation has obtained the passing mark and succeeded. If the passing mark is not obtained, it goes back to step S16, again, the same text reference voice is output from the speaker 36,

and the user repeats the pronunciation practice.

If one text is passed, in step S24, it is determined whether all texts of a chapter are passed or not. If there is any text that is not passed, it goes back to step S14, another text is selected, and the user repeats the pronunciation practice.

If all texts are passed, in step S26, it is determined whether all levels are passed. If there is any level that has not been passed, it goes back to step S12, another level is selected, and the user repeats the pronunciation practice for all texts of the concerned level.

If all levels are passed, in step S28, it is determined whether the other chapters are also passed. If there is any chapter that has not been passed, it goes back to step S10, another chapter is selected, and the user repeats the pronunciation practice for all texts, all levels of the concerned chapter.

As described above, in the present embodiment, the text is displayed and the reference voice is pronounced using a computer, while the student imitates this pronunciation and input from the microphone 20. Then, in the computer, the similarity between the reference voice data and the student input voice data is determined, and if the similarity is lower than a predetermined value, it makes the student repeat the pronunciation practice, and when it is becomes higher

than the predetermined value, a success mark is displayed. Thus, the pronunciation practice can be repeated as desired effectively, because the pronunciation practice can be repeated as desired for the same text, and pronunciation level determination result is displayed each time. In addition, the reference voice data is not limited to one kind, but three kinds including the beginner's level pronunciation data which is the pronunciation of a Japanese teacher, the advanced level pronunciation data which is the pronunciation of a particularly fluent native speaker, and the intermediate level pronunciation data which is the pronunciation of a foreign speaker who does not speak so fluently, thereby allowing to improve the pronunciation gradually from the beginner's level to the advanced level through the intermediate level, avoiding a case where the user can not succeed although he/she tries many times because the level is too high, and preventing him/her from losing the motivation.

The present invention in not limited to the embodiment mentioned above, but various modifications can be executed. For example, the essential configuration of the lesson screen has only to have the success mark and the other displays are arbitrary at all. Further, in addition to displaying only the success mark, the similarity to the reference voice may be scored, even in case of failure. Here, the reference

pronunciation and the user pronunciation are conducted alternately; however, it is preferable to make the user pronounce at the same time as hearing the reference pronunciation. In the reference voice database, not average data of voice data of number of persons (data after spectrum analysis), but the voice wave form of a particular speaker can be stored as it is. In this case, the voice synthesis unit 34 at the front stage of the speaker 36 is not necessary. In place, it is necessary to submit the voice waveform signal read out from the database to the spectrum analysis by the voice recognition unit 22 as the user input voice signal from the microphone, and to compare with the user input voice data. The object of practice is not limited to English and may include Chinese or the like, and it is not limited to foreign languages, but may include Japanese (National language) or the like. In addition, the corresponding Japanese may be displayed at the same time under the English text display. Further, in place of providing database for respective three levels, but it may be so constructed to use a single database, allowing to change only the level. It will be enough to have the repeated practice effects for the present invention, and it is not always necessary to divide the reference pronunciation into a plurality of levels.

As mentioned above, the present invention allows to provide a pronunciation judgment system capable of

determining whether one's pronunciation is recognized by the collocutor, and a recording medium for storing a computer program thereof. In addition, the present invention can provide a pronunciation judgment system allowing to practice the pronunciation effectively through a repeated pronunciation practice of the same text, and to practice the pronunciation effectively alone until the a predetermined similarity level is obtained by comparing, each time, with the reference voice, determining whether it agrees with the reference and displaying how it resembles to the reference pronunciation, and a recording medium storing the a computer program thereof.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

WHAT IS CLAIMED IS:

1. A pronunciation judgment system comprising:

a database for storing reference pronunciation data;

reference voice playback means for outputting a reference voice based on said reference pronunciation data;

similarity determination means for comparing a user pronunciation data input in correspondence to said reference voice and said reference pronunciation data; and

means for informing a user of a result of determination made by said similarity determination means.

2. The pronunciation judgment system according to claim 1, wherein said database stores a plurality of reference pronunciation data corresponding to a pronunciation fluency level, for the same language.

3. The pronunciation judgment system according to claim 2, wherein said reference voice playback means includes a user operative member for selecting a level, and outputs a selected level reference voice, until said similarity determination means detects agreement of both data.

4. The pronunciation judgment system according to claim 1, wherein said database stores reference pronunciation data of a plurality of level for each of a number of sentences, and said reference voice

playback means includes a user operative member for selecting a sentence and a level and outputs a selected level reference voice of a selected sentence, until said similarity determination means detects agreement of both data.

5. The pronunciation judgment system according to claim 1, further comprising means for displaying a sentence corresponding to the reference pronunciation data.

6. The pronunciation judgment system according to claim 1, wherein said informing means informs of the agreement of both data.

7. A computer readable recording medium for storing a program for causing a computer to execute the steps of:

reading out reference voice data from a database;

playing back a reference voice based on the read out reference voice data;

determining a similarity by comparing user pronunciation data input in correspondence to said reference voice data and said reference voice data; and

informing a user of a result of determination made by said similarity determination step.

8. The recording medium according to claim 7, wherein said database stores a plurality of reference pronunciation data corresponding to a pronunciation fluency level, for the same language.

9. The recording medium according to claim 7, wherein said reference voice playback step outputs a user selected level reference voice, until said similarity determination step detects agreement of both data.

10. The recording medium according to claim 7, wherein said database stores reference pronunciation data of a plurality of levels for each of a number of sentences, and said reference voice playback step outputs a user selected level reference voice of a user selected sentence, until said similarity determination step detects agreement of both data.

11. The recording medium according to claim 7, wherein said program causes a computer to execute also a step for displaying a sentence corresponding to the reference pronunciation data.

12. The recording medium according to claim 7, wherein said informing step informs of agreement of both data.

ABSTRACT OF THE DISCLOSURE

Database stores reference voice data for beginner's, intermediate and advance levels. Text in lesson screen displayed on CRT is selected, reference voice data corresponding to this text is read out and model pronunciation is generated. User listens to this, and imitates pronunciation. Computer obtains voice data through the spectrum analysis of the user voice by voice recognition unit and determines user pronunciation level. Predetermined success mark is displayed on screen, if user pronunciation is so good that it is communicated exactly to collocutor. If determination result is bad, practice is repeated for the same text many times. This allows user to judge if his/her pronunciation is recognized by foreigner and improve foreign language pronunciation learning effect, by repeating this practice.

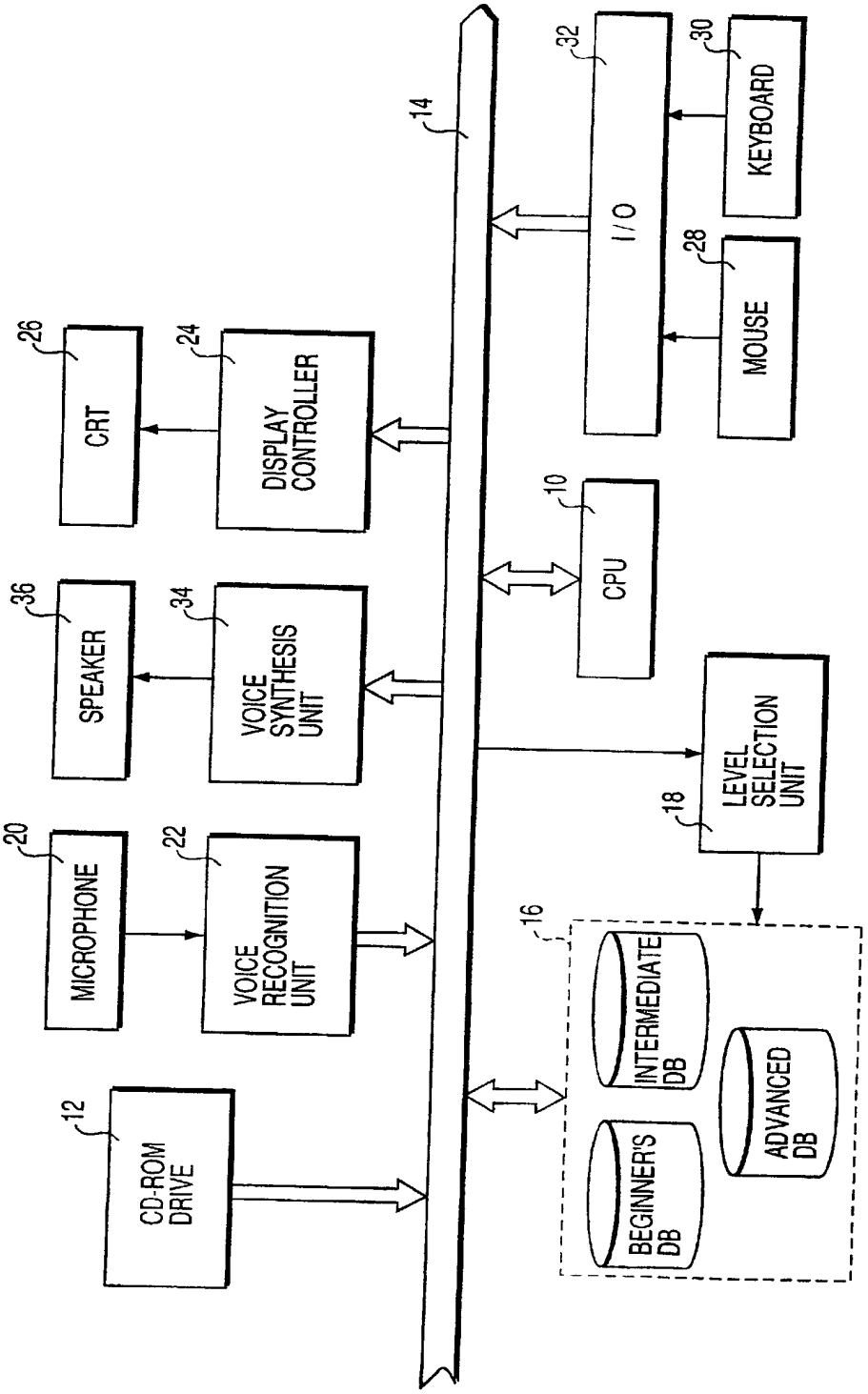
12
CD-ROM DRIVE
20
MICROPHONE
22
VOICE RECOGNITION UNIT
36
SPEAKER
34
VOICE SYNTHESIS UNIT
26
CRT
24
DISPLAY CONTROLLER
14
10
CPU
18
LEVEL SELECTION UNIT
16
INTERMEDIATE DB
BEGINNER'S DB
ADVANCED DB
32
I/O
30
KEYBOARD
28
MOUSE

FIG. 1

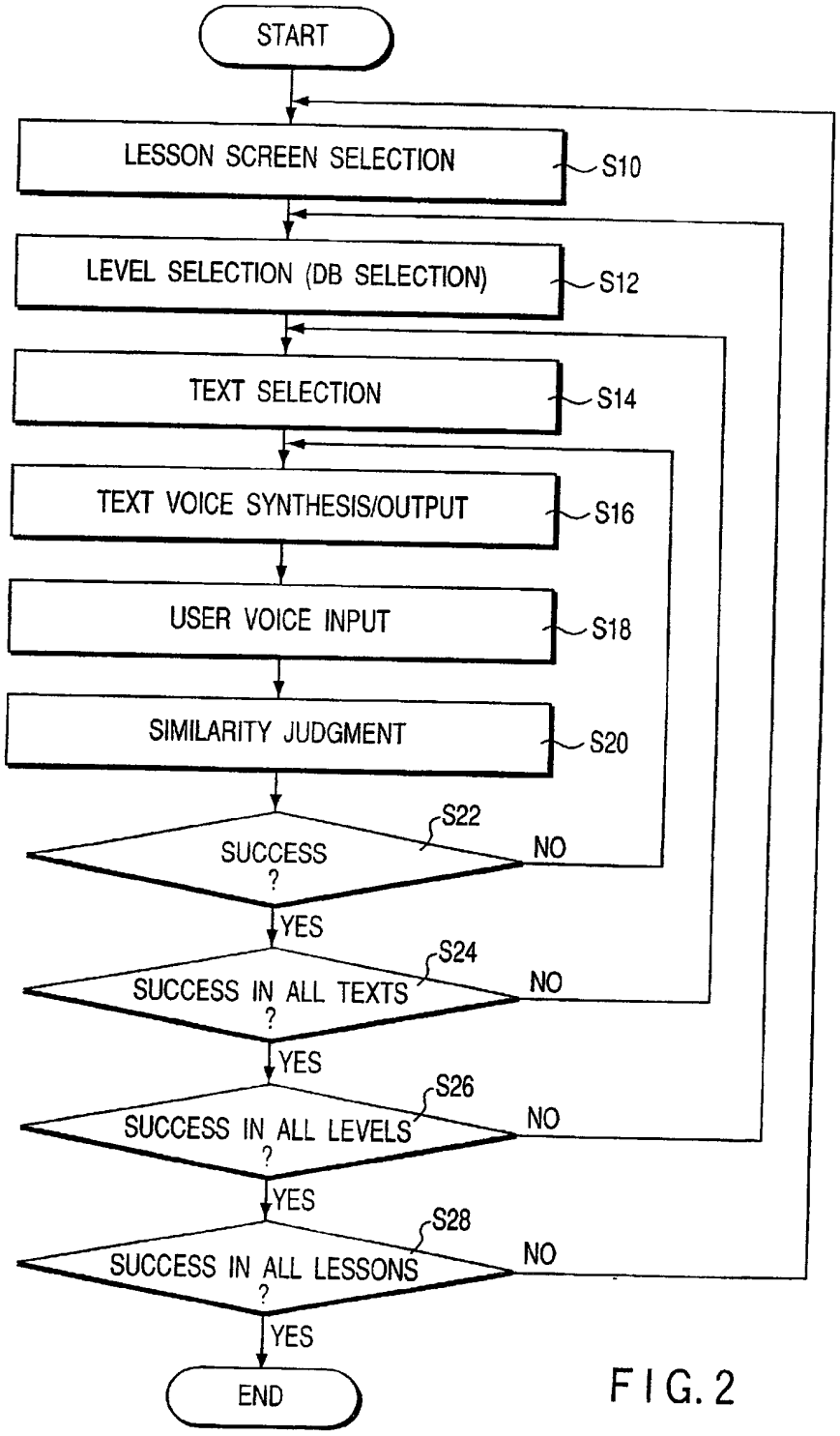

FIG. 2

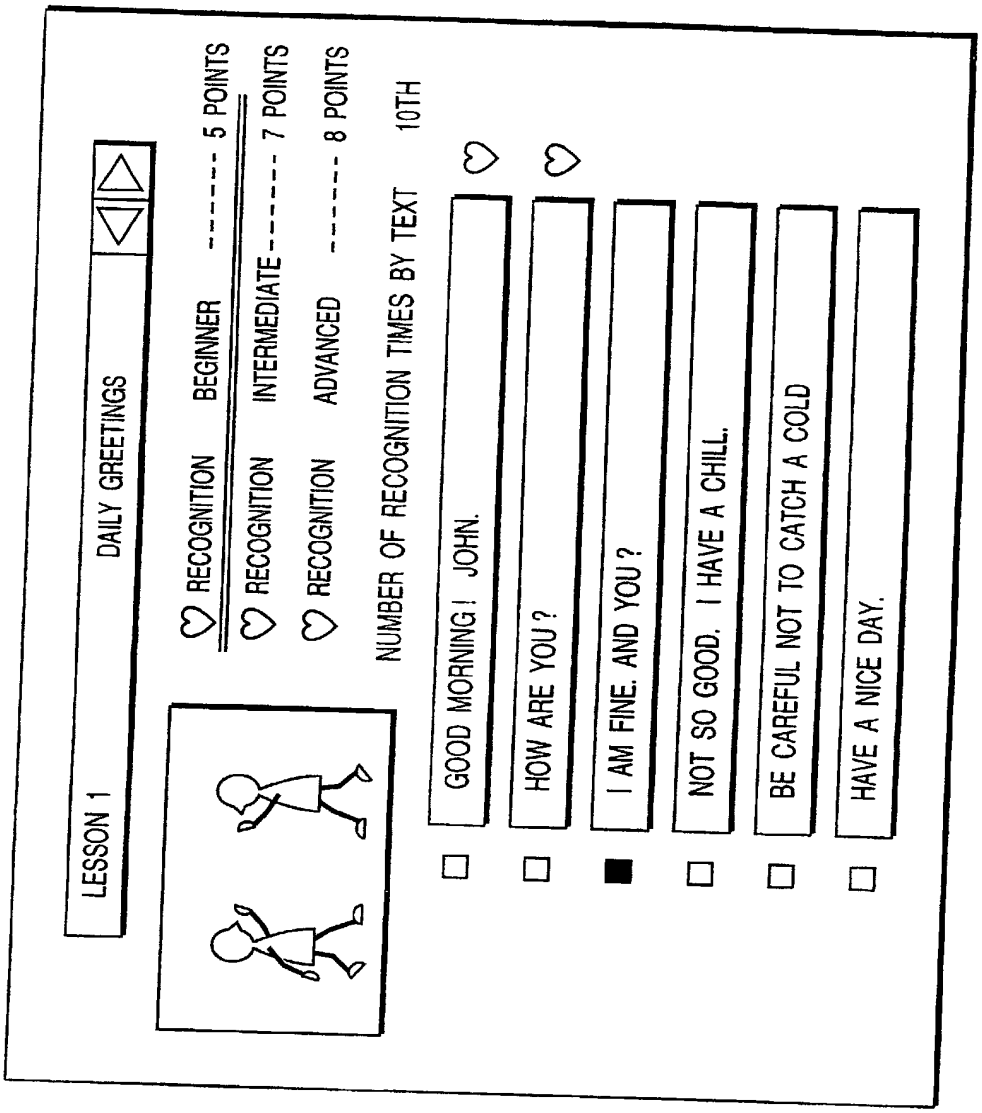
LESSON 1
DAILY GREETINGS
RECOGNITION BEGINNER ------ 5 POINTS
RECOGNITION INTERMEDIATE ------ 7 POINTS
RECOGNITION ADVANCED ------ 8 POINTS
NUMBER OF RECOGNITION TIMES BY TEXT 10TH
GOOD MORNING! JOHN.
HOW ARE YOU?
I AM FINE. AND YOU?
NOT SO GOOD. I HAVE A CHILL.
BE CAREFUL NOT TO CATCH A COLD
HAVE A NICE DAY.

FIG. 3

P-0105S

(99S0755P1)

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I declare that my residence, mailing address and citizenship are as stated below above my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PRONUNCIATION JUDGEMENT SYSTEM

the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 35 U.S.C. 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed:

None

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s) or 35 U.S.C. 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, which became available between the filing date of the prior application and the national or PCT international filing date of this application.

International Application PCT/JP99/05257, filed September 27, 1999

I hereby appoint as my attorneys, with full power of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: Henry A. Marzullo, Jr. (Reg. No. 20,910), Howard N. Aronson (Reg. No. 27,302) and Myron Greenspan (Reg. No. 25,680), each of whose address is Lackenbach Siegel Buliding, One Chase Road, Scarsdale, N.Y. 10583, or any one of them, and request that correspondence be directed to Lackenbach Siegel Marzullo Aronson & Greenspan, P.C., Lackenbach Siegel Building, One Chase Road, Scarsdale, N.Y. 10583. 3

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

[1st Inventor]

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Country of Citizenship: Japan

1/2

Akitoshi kojima

Akitoshi Kojima

May 14, 2001

Date